THE LATE LORD LEIGHTON'S HOUSE.

ON the 20th February 1896 a sketch of Lord Leighton, from the pen of Professor Aitchison, appeared in the JOURNAL,* under the head of "Some Reminiscences." The article concluded with a suggestion that his house in Holland Park Road, with all its artistic contents, should be purchased as a memorial to so distinguished a man—just as the Italians have preserved the houses of Petrarch, Boccaccio, and Michelangelo; the people of Antwerp the house and printing-offices of Plantin; and the Nurembergers the dwelling-place of Albert Dürer. Among the wealthy people of this country, however, no one was found of sufficient public spirit to come forward and purchase the house and its contents for the nation at an outlay of a few thousands, a sum that would scarcely be missed in his year's expenditure. As Lord Leighton had verbally requested his sisters, who were his executrices, to make certain bequests, every picture, statue, bas-relief, drawing, sketch, and article of *virtu* went to the hammer to enable his wishes to be complied with. Fortunately, the results of the sale enabled them to carry out his bequests, and the house, which had been bought in, remained on their hands. With the same munificence that distinguished their brother, they have offered the house to the public, that it might remain as a memorial to him. This, however, cannot be done unless sufficient public interest is aroused to provide the few necessary thousands to pay the ground-rent, outgoings, and the cost of a curator and attendants.

Lord Leighton ranks among the most brilliant Englishmen born in the second quarter of this century. As a painter and sculptor he possessed an exquisite knowledge of the human form, which naturally led him to choose Greek subjects; he was a master of the composition of line – a very rare attainment in England—and was often splendid in colour. He was one of the greatest promoters in this country of the visual fine arts in all their varied forms. He was, again, not only an orator and a linguist, but was endowed with a loftiness of soul and dignity of demeanour that raised him far above his fellows. There is little doubt that if the proposal were carried into effect, and his house secured as a museum, many of his pictures, sketches, and correspondence would be forthcoming; the house and its contents would thus fulfil a double purpose, and serve, not only as a memorial to a great artist, but as a means of instruction and delight to the people.

The permanent colouring of the interior has great merits in the eyes of those best qualified to judge—the painters and others of cultured taste who have observed much and travelled far. In a discussion on "The Architect's Use of Colour" † at one of the Institute meetings of last Session, Mr. John Brett, A.R.A., said that "they had got a specimen of the treatment of the inside of buildings with specific colour at Kensington in the house of the late Lord Leighton.

* Vol. III. Third Series, p. 265.

† *Ibid.* p. 365, at p. 379.

THE ARAB HALL IN THE LATE LORD LEIGHTON'S HOUSE, HOLLAND PARK ROAD.

There they saw an effect of which there was no question—everybody was completely agreed about it—that the result was exquisite; and it depended upon fine marbles, very beautiful Oriental tiles, and an admirable mosaic frieze. Those three specimens of specific colour were shown in the interior, and they were probably as enduring as the world. If they wanted to construct a public building, they could not do better than begin by studying that great example of modern art in colour." On another occasion Mr. Purdon Clarke, who has travelled over a great part of the civilised world for the purpose of inspecting and purchasing rare and beautiful objects for our National Collection, declared this to be "the most beautiful thing that had been done in Europe since the sixteenth century." Most architects, indeed, with an eye for colour must admit the merits of the vista from the Staircase Hall and the beauties of the Arab Hall; while no person of taste who is not colour-blind could fail to be struck by the richly coloured vistas from the Arab Hall to the Staircase, and from the Staircase to the Arab Hall, not to speak of the effect on the eye of its passage through darkness into light. It must be remembered, too, that though the Saracen tiles are both rare and beautiful, it is their harmonious juxtaposition to gold and variously coloured marbles that causes the transcendent effect.

Monsieur Choisy, in a letter to *The Times* of 27th April last, says:—"England has at all times given the example of honouring great men. She will, I am sure, find the means of preserving for Art a monument of which she has such reason to be proud." If there is no one, "of all who followed, flattered, sought, or sued" the late distinguished President, who will provide the funds necessary to maintain his house as a museum for the people, and as an enduring memorial to his fame, then let us appeal to those institutions which have the spending of such large sums for the purpose of improving the taste of our ornamentalists. Can none of these establishments, associations, or individuals help to preserve and maintain this magnificent piece of monumental colouring at home, the equal of which we must travel into Asia to see, and which has been so munificently offered to the nation?

HANOVER CHAPEL.

THE loss of a public building, unless it be distinctly unworthy or obscure, is never to be lightly regarded. When the lost creation happens to be large, important, prominent in more senses than one, familiar, conspicuous from its position, worthy from its designer's worth, and reputable in its purposes—when, indeed, it adds to all these qualities some degree of beauty, the sense of its loss is only very slightly mitigated by the vague possibility of its being superseded by something better, or by the insistence on the prosaic though cogent causes which dictated the downfall.

One is aware of the special danger to which the sentimental Londoner is of all men most prone, the danger of investing with sanctity almost anything that has become familiar to his daily glance. We must nearly all own to some fibres in our constitution which engender, half unconsciously, an unreasoning conservatism towards the things that are. Such indiscriminate affection is reprehensible. Reprehensible, too, though more specious, because having the semblance of a right spirit, is the stretching to undue lengths of the theory that association should be a safeguard to any building. Some associations, to be sure, are strong enough and excellent enough to save the most ugly and worthless building on the most valuable of sites. But there is prevalent an extravagant overgrowth of this view of the sanctity of association which is pernicious even to the right sentiment which it apes. One may point specially to the craze which claims immunity for the buildings which

have been touched even incidentally by fiction. The notion that because, for example, Charles Dickens, in a work of imagination, has hung some shred of his narrative or even woven an entire plot round a particular street or house, that house or street should be propped up in tottering uselessness, or even ugliness, to the end of time, is not only an outrage

HANOVER CHAPEL, REGENT STREET, RECENTLY DEMOLISHED.

on common sense (which, perhaps, is no great matter), but it is an insult to the immortality of the writer. Let us by all means, if we like to do so, increase our interest in the works of the great writers of fiction by associating them with the places they have chosen as their scenes; but let us never imagine that the destruction of such visible memorials, if desirable on reasonable grounds, can be in any sense an artistic impropriety. In the present instance

there is no question of violated associations. It is on other and, I believe, more reasonable grounds that some of us shudder at the new-made hiatus in Regent Street. To be sure, there is many a building still standing in London whose fall would mean a greater calamity than the hacking down of Hanover Chapel. The members of this Institute made through their Council a protest against its threatened doom, but now that it is gone the equanimity with which the loss is borne by some of the protestants is attributable, I suspect, to a kind of half-heartedness in their previous admiration. Even those who own to a real pang as they pass the forsaken gap would perhaps analyse their regret rather into sentimental emotion than into a loss estimable under definite terms of artistic value. If we so do, we are possibly too fearful of our own enthusiasm, too depreciative of the virtues of the building and the skill of its architect. Let it be the object of this article to offer some homage to the artist and some tribute of appreciation to the qualities of his now lost work.

Cockerell was an architect of such calibre that even a failure from his brain would at least be worthy of consideration. It was said of him that he was the only man who could *design* a classic moulding. By which saying was meant that so completely had study made him master, not merely of the dry bones but of the spirit of classic and especially of Hellenic art, that he could safely allow imagination as well as precedent to be a factor in his compositions. With most architects who have practised the stricter forms of classical architecture, to quit the channel of authoritative prototypes has been to fail of the spirit of the style. Herein lies the imperative absolutism of the Greek and Roman formulæ. A man must have in him something of the Bramante or the Michelangelo to be successful in divagation. For common men safety lies in the normal. Cockerell, though conscious of his ability, was sparing in his licence. He acknowledged liberty, but took no liberties. The columns of his inner order, a variant of the Corinthian, which he based on that of the Golden Gate of Justinian at Constantinople, were lengthened to eleven diameters, and the entablature correspondingly lightened, on the ground that "those proportions which are deemed just externally should be lightened when employed internally and brought close to the eye of the spectator, where there is so much less effect of light and shade to diminish them."

Here was the exercise of liberty; but there was no undue levity of imagination about the man, no straining after invention for invention's sake. The building was to be scholarly if original, and rule and precedent have at least their fair share in the composition.

The proportion of the central door, whence was it derived but from Vitruvius's precept of the relation of such an opening to the whole frontispiece? That diminution of the dentils under the belfry, who dictated it but Palladio? Vitruvius again, and with him the Books of Kings, are responsible for Cockerell's special attention to the "magnitude and order of the stones composing the masonry." You must go to the Temple of Minerva at Priene for the details of the external order (both columns and antæ), and to the tetrastyle portico of the Erechtheum for the general proportions of the front. You smile, in fact, at the affectation of so much pedantic reference; but do not call it affectation or pedantry. It is manner, the fashion of the age—nay, more, it is the keynote of the method of the hour. To disregard it, or to laugh at it, is to misinterpret the work by approaching it in a spirit of criticism wholly alien to the spirit of its production. Such criticism, however valiant, is valueless. There is a law governing the conditions of appreciation which is constantly overlooked, but consistently potent. A work of art, or a work claiming to be of art, may possibly be unworthy of your attention altogether; if so, ignore it, but do not scoff. It is an absolute truth that the value of a work of art can only be estimated by sincerely attempting to view it in the spirit of its inception and creation. Sympathy, in fact, is the key to criticism. Unsympathetic estimation is estimation no longer; it misses its own intention; it is like meeting a rapier with a

bludgeon—the unequal combat may raise a laugh, but is only clown's play at best. To appraise the value of work like Cockerell's you must transplant yourself spiritually into that placid age of seventy years ago, when for some mysterious reason the obsolete word "Grecian" was the substitute for "Greek." This building had, however, less subtle beauty also, a more obvious quality of attraction that could appeal to the careless, unstudious eye. You might know nothing of the Vitruvian and Palladian niceties; you might be unconscious of the characteristics distinguishing the temples of Priene and Athens, or ignorant of Cockerell's adherence to their precedent, and yet look affectionately for the first appearing of that well-known pediment as you rounded Regent Street, and greet it daily with a brightening of the heart. Many uncritical laymen will miss it nearly as much as that blind reader of the Scriptures who has been driven from the vanished portico to set his back against the unconsecrated wall of a neighbouring bank. The dome, I admit, was a failure; its glass-panelled sides, useful no doubt, and justified in their deviser's eyes by the precedent of Wren's extinguisher in Warwick Lane, had a gaunt, unsolid, haggard look, which made one prefer those points of view from which they were mercifully concealed.

In the matter of plan Cockerell deserved special praise. He was confronted by as nasty a problem of site as an architect could well find set before him. Here was a plot of ground narrowed at the back by houses on one side and by a right of way on the other, with no means of approach except on the east side, the side which, by express condition, as well as by ecclesiastical usage, had to contain the altar. That he solved his problem with real skill no one will doubt who ever entered the church, or who, if he never did so, will look at the plan in Britton and Pugin's *Public Buildings of London*. Good lighting, convenient seating, and the attainment of symmetry—three primary objects in view—were all defied by the exigencies of the position, all fought for and all achieved. Achieved, if you will, rather after the Hanoverian manner than according to the rules of the Directorium Anglicanum, but none the less achieved. Let me add, while recording the facts of the design, that the site was given by the Crown at the solicitation of the Commissioners of "the new street," that the building was of Bath stone (more credit to it for lasting seventy-one years), that it could accommodate 1,500 persons, and that it cost £16,180, a price which represents, as I calculate, a rate of $11\frac{1}{2}$*d.* a cubic foot.

It has gone. The time, too, has gone in which men waxed fervent over "every endeavour to naturalise to our climate and our uses the purer taste displayed in the Greek buildings," and in the same breath could warmly decry the pursuit of "the extravagant and corrupt style of Louis XIV., or the early architecture of our less cultivated ancestors"; but we can still, and with real regret, mourn the removal of that graceful breach of the law of frontage which will now no doubt be replaced by the less interesting decorum of uniformity.

PAUL WATERHOUSE.

NOTES ON COTTAGE ARCHITECTURE.

By Ralph Nevill [*F.*], F.S.A.

When an architect is asked to design cottages, it is generally in order that the result may be something better than the "irreducible minimum." At first it would seem easy to solve all the problems connected with so simple a building as a cottage; but there is a difficulty on account of the very small available margin of cost, which makes every trifle of importance. A differential outlay of 10*l.*, which is a trifle on a house, is a very large matter on a cottage the rent of which does not depend on the amount spent on it, but on other considerations. Country cottages are likely to become much more important in the future, as already the largely increasing use of bicycles by workmen, and the probable development of light locomotion, may not only check but possibly reverse the immigration into towns. The subject seems to divide itself naturally into four heads:— 1. The Accommodation. 2. The Style. 3. The Plan. 4. The Material.

ACCOMMODATION.

At the outset of No. 1 there confronts us a question of "high politics" that may seem beyond the consideration of architecture, but lies so at the root of the whole question that one must be pardoned for travelling beyond the proper province of these notes. The question is whether cottagers are to have a kitchen as well as a scullery big enough by squeezing to be turned into a working kitchen. The kitchen will then infallibly be turned into a parlour, which will be kept shut up, except on Sunday afternoons, or to receive visits of "the quality." It is the opinion of many that efforts should be made to induce cottagers to use their best rooms for ordinary use, and it is always a great temptation to try and make people happy and virtuous against their will. Experience convinces one of the necessity of bowing to one of the deepest-seated instincts of cottage-dwellers; after all, it is just possible they know their own business best. Certain it is that they will leave a large roomy cottage of the old sort for a modern one where they can have this luxury (however dearly bought) of a best room. As it is, the "best room" is a sort of holy household shrine of most potent influence; and even if seldom used, it is ever present to the cottager's mind as an outward and visible sign of respectability. Again, the three bedrooms that are now imperatively demanded almost necessarily require under them a larger floor-space than suffices for the one ground-floor room. In these days of low interest and high wages, it will be more easy to get the money for good cottage building than it used to be. With regard to bedrooms the accepted rule of three is no doubt right. In spite of the probability of overcrowding, it is desirable that there should be accommodation for lodgers in a village, and that the cottager should have the chance of making a little money. The copper and E.C. are, of course, necessaries; and in the North of England a baking oven is regarded as such, but it must be left to the client to decide if he will supply this. A verandah or covered place at the back, where washing and other things can be done in the open, and yet under cover, is an enormous boon to a cottager, and might more often be given at a trifling expense. Of soft-water butts it is impossible to have too many; no rain-water should ever be wasted if it can be helped. Demand for a larder is frequently made, but this is an altogether needless luxury, as a very small cupboard with perforated wire is quite sufficient for all that will be kept there, and some unobjectionable place can generally be found for this. On the other hand, places for tools, and any number of cupboards, are most useful.

STYLE.

With regard to Style, one may quote from the present writer's book on *Old Cottages in Surrey*:—

> The great lesson to be learned from the study of these old examples is, I take it, the extreme value of simplicity. It is a lesson peculiarly needed, since even when an architect is anxious to work on such lines it is seldom that his client is content to let him. There is far more beauty in a cottage of some of the simpler forms shown, with its roof bright with lichen and its front covered with creepers, than we shall ever get from modern examples, tortured as they are into fantastic shapes, where all repose and simplicity are lost.

There is no greater mistake than this undue striving after effect. It increases the cost quite unnecessarily, and causes a stinting and grudging of internal features that are most desirable. For ordinary use nothing more can be wanted than a perfectly plain building. It is in the proportions that the effect should lie. A building plainly roofed in the manner of many an old cottage is all that is necessary, without ornamental gables and cross roofs, which vastly increase the expense. The great point is to keep the eaves low; so small a building will never look well with high walls, and an immense part of the charm of old cottages lies in the unpretentiousness of their walls. Quite sufficient fillip can be given to the front at a very small expense by bestowing a little attention on the windows, the detail of which need not be starved quite so much as is usual.

In country districts, where the same builder generally does the work for an estate or for the architect, the joiner's work, being made of what

become stock patterns, can be very cheaply produced. It is a good plan to arrange with a builder who has good machinery (which is a most important factor in cost) to run mouldings from the architect's irons, and make all such joiner's work as fancy cupboards, mantelpieces, &c., to architect's patterns, and, wherever it can be arranged, to supply doors and windows, both of these being made to the regulation patterns that are most suitable. The cost would be slightly more than that of a London machine-house; but by the time allowance was made for cost and worry of carriage and faulty work, there would probably be a saving. The village builder might then carry out the rest of the work, which he could generally do to greater advantage than the larger man who could not afford superintendence for such small work, and might not care to be worried where such little profit was to be had. Machinery requires so much feeding that the owner is generally glad to get work for it, and, where he is on good terms with an architect, is often glad at slack times to make a short stock of doors or mantels that he knows are sure to be wanted. Some such arrangement is practically the only way to get an architect's own designs carried out at as cheap a rate as the common patterns. If an architect wants anything better than the ordinary work he must be prepared to take the trouble and thought off the builder's hands. Workmen, as a rule, are intelligent, and after a little help at starting, they readily adopt a new system, and the tradition once created goes along by itself. Unfortunately, one has still to tackle the youthful builder's clerk, fresh from the crude building instructions of some School of Art or Polytechnic. If any art is to be put into the humbler forms of buildings, it must at present be by the personal exertion of the architect. He must not be content to sit at home and make drawings, and expect the builder to do the rest, but he must take all the trouble of new materials and methods on his own shoulders and off the builder's. A great deal of help can be got from workmen, but the architect should, above all things, attempt to associate himself with a suitable builder who will work with him to their own and their clients' advantage. This can, of course, only be done by provincial architects, but it is not desirable that such work should be in other hands. If the architect is to have full control, it is absolutely necessary that he should have a complete knowledge of quantity-taking, otherwise it is impossible for him to know which features cost money and which are inexpensive. Solid brickwork is retained that costs pounds at the expense of a little piece of joinery that would cost as many shillings, and the introduction of anything new is impossible. Experience teaches us that a good tradition may very soon be created which will be a moral satisfaction to the architect, even if he find—as he probably will—that work in his style is carried on without his assistance. The problem of cost is to be solved by getting rid of the solid wall by some such means as that described later. Where strict economy is necessary, plain roofs of Roman, lock-jaw, or other pantiles may be used with advantage, but only where there is little or no cutting. Some of the old-fashioned small grey or thick slate may be used, and look very well. Plane tiles are best, as they give a greater thickness, and can be cut to valleys, &c. Stone may be used for the outside of walls if it be rough-cut, or can be used without being dressed—fine dressed stone spells ruin. Artificial stone may with great advantage be used for steps, and such things as bases for timber-posts.

The windows should be always casement, as the most homely, the least expensive, and the less costly to repair, and old examples teach one that the glass width should not exceed 1 ft. 3 in., and that the required size should be got by lateral expansion of separate lights. It will probably be safe to say that the superficies of bedroom windows should not be more than absolutely required by the by-laws. The greatest lesson to be learnt from a close study of stone cottages and ordinary houses in the West is the absolute sufficiency of a perfectly plain rough-cast wall relieved by the distinction given by a moulded and mullioned stone window. Wherever an old mullioned wood window is to be found in other cottages, one is at once struck with the same air of distinction. Nothing could beat a cob wall, as used in Devonshire, if one could insert a damp course and protect on the weather side. With the use of a mixing machine, it might be possible to revive the use, but only by an architect who could guarantee a large employment of the material.

PLAN.

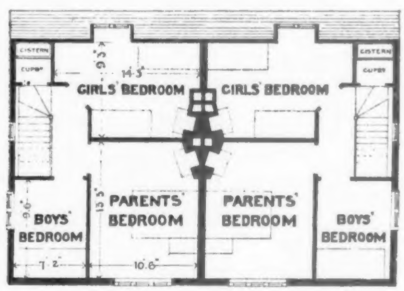
As regards Plan, it may be taken for granted that normal cottages will be built in pairs, whether the block is of two or four cottages. This is a question of economy of chimney-stacks. In a double cottage, which is the usual type, it becomes impossible to supply chimneys to the third rooms. This is of no consequence as far as heating is concerned, as they would never be used while cheap paraffin heaters are to be had; but it is of importance with regard to ventilation, as, even if the flues be stuffed up, as will almost certainly be the case, some air seems to find its way through. It is difficult to keep a room sweet that has no chimney. Ventilators are no use, as they are so easily stopped, and perhaps the best plan is to use the very un-architectural device of a stove pipe turned up against the wall—and this, after all, need not be unpicturesque. The living-room or parlour must face the road, whatever the aspect may be. To a cottager this question of aspect, all-important to others, is not of much consequence. It is desirable to combine the

possibility of cooking with the comfort of an open fire. Most kitcheners are hopeless in this way, but there are two very neat kinds called the Star and Eclipse that have the oven under the fire and a movable top. They are excellent in working, and very nice to look at, the open fire being as ornamental as that of an ordinary grate. It is wise to pay for an extra strong top. If cupboards can be arranged in this front room they will be much appreciated. A modification of the old-fashioned corner cupboard is very inexpensive and suitable. A pane of glass in the middle and a shaped shelf will be well worth their cost. Human nature is much the same in all degrees, and every one has seen in old cottages as much space taken up with the display of old crockery and knicknacks as in the most æsthetic drawing-room. Very often a cupboard in one corner will restore the symmetry lost by cutting another corner off for a passage. Such an arrangement is seen in the plan shown later, and designed for a superior class of mechanics. Of course, there are so many more feet of angle to be paid for and other expenses. The provision of a chimney-corner is a luxury not difficult to manage, but distinctly a luxury. It is best managed when an American stove is used, when a combination of seat can be arranged in joiner's work. A cottager is like other folk, and will prefer an irregular room with nooks to four bare walls. Certainly, fixed cupboards are much appreciated and a great advantage. The drawback is that the landlord has to keep them in repair.

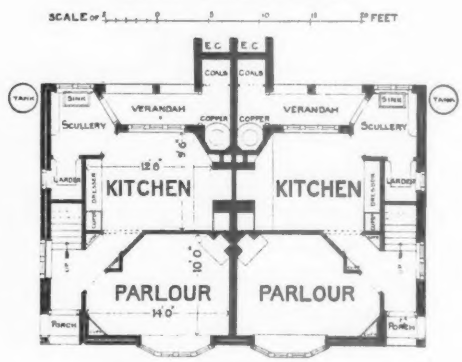
One of the most important questions is the height of rooms, and here one is confronted with difficulties caused by the whims of unpractical scientists. In the first place, one has generally to make no provision in cottages for the vitiated and heated fumes of gas, and oil is not used in sufficient quantities nor for sufficient duration of time to give trouble. It may be stated boldly that one cannot have a cottage living-room too low, and it must be remembered that under hardly any circumstances will any body of people be shut up tight in a cottage living-room, the door being pretty sure to be constantly open. On the other hand, to have to warm a large room in winter is a serious matter. In workshops or bedrooms the provision of a certain cubic space per individual is important, but entirely superfluous in an ordinary living-room. A recent discussion upon the advantage of a downward extraction of foul air in hospitals will have confirmed most practical men in their support of the open fireplace, as not only the most agreeable and sanitary form of heater, but the most scientific ventilator, since it is always acting as a downward extractor. Clients will often ask for rooms nine feet high. Not only is the expense unnecessary, but it is quite impossible to make the external or internal appearance of a cottage even respectable when such a height has to be dealt with. Nearly all by-laws require a minimum of 8 feet, and this is a very reasonable standard, but one that should certainly not be exceeded.

Even if the second room be not large enough to be used as the working kitchen, it must have a cooking stove, which should be such as to work with the smallest possible amount of fuel; large bakings may very well be done in the front room, and joints have not often to be provided for. Oil cooking stoves are now commonly used, and can generally be placed on the ordinary range; but it is as well to have a small recess communicating with the flue for an oil stove. An important part of this room is the sink; and it is most desirable, whatever the size of the room, that the sink should be in a cupboard, where it can be shut off by a door when not in use, or be otherwise covered. On no account whatever should the sink be fitted with a trap, in spite of all the sanitarians in the world. Nothing can keep a trapped sink sweet, and nothing can be more unnecessary than a trap. The outlet should connect to a 3-inch or 4-inch bendpipe of best stoneware, which should pass through the wall and connect with an open channel pipe—which is best of the kind that has the top quarter open. Some years ago Doultons made some bends of extra length, so as to pass through any ordinary wall up to 14 inches; but it is simpler and better to use the ordinary bend and form the joint in the wall, leaving a slit in front for complete access to the open pipe. The short bent pipe can then be cleaned from outside with the greatest ease. This open pipe should empty over a Duckett's three-gallon tipping basin, which should be kept above the ground, or so arranged that pails of water can be emptied directly over it. These basins are among the most valuable of all sanitary fittings: they do not seem to be sufficiently known in the South, though they are cheap, most effective, and do not get out of order. A trap is attached to them on the drain side, and the automatic discharge of the three gallons effectually keeps the trap clear. When the trap is fixed to the basin, it can be easily cleared from the basin, and no access holes are required. The trap is not likely to get unsealed. A convenient cupboard to serve as a larder can generally be provided under the stairs, and may with advantage have one or two air-brick ventilators; if the inside of these be splayed, they will give ample light. In cases where there can be no direct opening to the air, a drainpipe should be brought through the concrete and be turned up inside; there will then be ample inlet of fresh air, and the exit will take care of itself. Reference has been made to the immense advantage of a covered place at the back. Half the household work may then, for most of the year, be done outside, baskets and tools be put down, dirty boots taken off, and wet clothes hung up; the washing can also be done here instead of in the open air.

It is not necessary to give a number of plans, as the general conditions are well known to all architects; but a plan is shown which is the result of experience and efforts at improvement, and illustrates what has been stated as to various arrangements. This plan is substantially that first designed for a village to be built by the South-Western Railway for their mechanics when moved to Eastleigh. The cottages were designed in large continuous quadrangles round village greens, for the use of superior mechanics; but it is questionable whether it is good financial policy to give an agricultural labourer much less. Unfortunately, serious drainage difficulties had to be encountered,



FIRST FLOOR PLAN

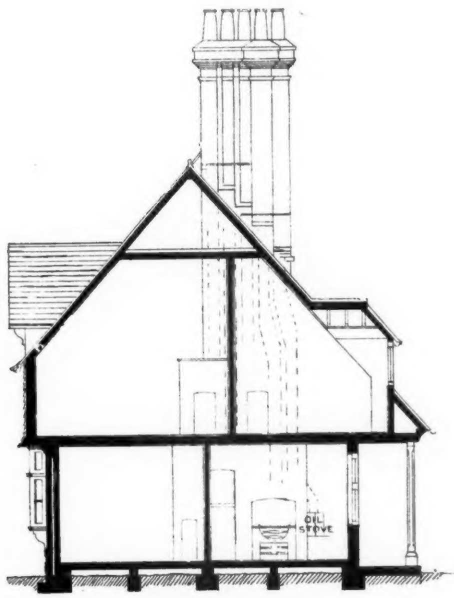


GROUND PLAN

as well as some private interests. The plan has therefore never been carried out, although accepted at the time. Experience in many parts of England shows that, in spite of all we hear of rural depopulation, there is not a decent cottage standing empty anywhere; but, on the contrary, a great demand for them everywhere. In the accompanying plan an arrangement is shown by which the indispensable copper is placed at one end of the verandah, and so arranged that the flue is taken into the main stack of chimneys. There are some advantages in this, but a short, independent chimney would no doubt be cheaper. Also, if the washhouses can be put in a separate building, it is no doubt an advantage. If placed at the end of the verandah, as shown, no space is required for more than copper itself and standing space, as tubs, &c., are placed in the verandah. In some cottages of similar plan a baking oven was substituted for the copper, and the copper put in a washhouse. A coal-house may be arranged at the other end of the verandah, and a place for tools in the roof.

If cubic space be not necessary in the living-rooms, it is most important in the bedrooms. It is perfectly idle to provide ventilators, as they are always immediately and efficiently stopped up, and most people will heartily sympathise with this. Unless each separate ventilator is under the constant superintendence of a highly skilled attendant, they are nothing but an unmitigated nuisance. Cottagers and many others do not seem to care how close and foul their rooms are, and regard it as a wilful insult to Providence to sleep with an open window. It is therefore most desirable to supply them with as much air as possible. This can only be done economically by opening their rooms high into the roof, after the old fashion; but this absolutely requires a more solid and temperature-proof roof than is usually provided. In the builder's cottage there is often a square ceiling to the bedroom, but there is nothing but thin slates and a coat of plaster between air and room, and every one knows how cruelly inefficient that is. By cutting off four or more feet of brickwork and putting a properly protected roof, a much better weather protection can be obtained at no greater cost. The reason the ordinary builder uses so much brick wall is, not that it is cheap—on the contrary, it is the most expensive part of a building—but it is because it gives him no thought and trouble. Some years ago the writer brought to the notice of the Institute a plan he had adopted of laying tiles and slates on a bed of concrete plaster laid over the backs of the rafters: this was done at a proved extra cost of 15*s.* a square over the cost of plane tiles on heart of oak lath. Rooms roofed with tiles in this way are as warm as if enclosed with a brick wall; and even when slates or some of the varieties of pantiles are used, the rooms are quite sufficiently temperature-proof to be used in the best houses. On the other hand, boarding and felting are in no way satisfactory or effectual, and are at least as expensive. The section shows how a roof may be used to give nearly all the accommodation for the bedrooms with easy and strong construction. If 7-inch joists are run right through from back to front (breaking joint on the centre partition if required), they form the ceiling of the verandah and firmly tie the whole roof together. The collars must be put at the right height for strength of tie, and be properly halved, shouldered, and nailed. Purlins, which are dangerous things, can then be dispensed with,

and no principals are required. If possible, the dormers should be so arranged that the same ridge runs through and serves for both; but in all cases ridges of dormers or gables should run through and be spiked to the rafters on the other side, so as to form a truss. Stringent by-laws have recently come generally into use, and probably some of them might conflict with these high ceilings. There is



SECTION *

SCALE OF 5 0 5 10 15 FEET

a ridiculous idea among some sanitarians that the action of air can be controlled, and that the bad will always go to the top, and, unless an exit be provided, stay there. In a gas-heated room there is some truth in this, and it might be possible to so arrange tests as to favour this idea; but certainly in practice fresh air has a way of going everywhere, and mixes with the foul just as wine with water. Inlets and outlets interchange their action; but the foolish regulation that insists on the provision of openings within a certain number of feet of the ceiling would only have the effect of bringing the ceiling down, and of depriving rooms of what at the worst is a receptacle of foul air. It is not intended to say anything against regulations prescribing a minimum height for the tops of windows. It will be seen that in this plan the amount of solid wall is reduced to a very small amount, the principal item being in the chimney stack, which is necessarily high. There is also very little facing of any sort to provide, as the roof covers most of the outside: this is economical. The back wall may be of 9-inch brick or of concreted studding, as detailed later.

* In the section the ridge of the small dormer should have been shown as running through to the partition and supporting a purlin. The ground floor is shown as of concrete laid upon sheets of thin black corrugated iron clear of the ground. I have used this construction for some years, as where the material for concrete is at hand it is little more expensive than the ordinary floor.—R. N.

MATERIAL.

The material of which cottages may be built will vary with the locality. There is, however, one material of the most invaluable nature that can nearly always be procured and profitably employed. That is concrete. It may not be adapted for the whole fabric of a building; on the contrary, it can seldom be profitably so employed; but for certain parts it is invaluable. Mr. Potter, one of the pioneers, and others have shown how concrete may be used much more extensively, but what is here recommended does not require special attention, training, or appliances. In most parts of the country there may be obtained gravel, stone rubbish and chippings, mine refuse, clinkers, or the rough part of clean engine ashes from any factory or extensive range of greenhouses, or even hard-burnt ballast. The architect will have a little difficulty at first in training workmen to the use of it; it will be found an invaluable material, not only for footings, but for the bases of walls as high as the plinth. There is no difficulty in staging so much, but any one can do it with a few scaffold boards and pegs, and the large number of bricks and the large amount of skilled labour that are swallowed up by this part of the work are thus superseded. The foot or more below the plinth can be afterwards faced up with trowelled Portland cement, which is effectual and effective, whatever the superstructure may be. A solid slab homogeneous with the foundation is thus obtained, giving immense strength. Of course, lime is of no use for this concrete; but the use of lime concrete may be considered absurd, as so little Portland cement or Selenitic concrete is required in proportion that it must always be cheaper. Some of the hydraulic limes may be nearly as effective. For foundations in trenches 1 of Selenitic to 5 of clean aggregate makes work as sound as a rock. Contrary to what the older text-books say, the aggregate of concrete for all architect's purposes cannot be too clean and free from sand; the elaborate instructions for proportioning clean, sharp sand are totally wrong, as any experienced concrete builder or any workman knows. It is high time this false instruction were corrected, as it might lead beginners very much astray. For the bases of walls 1 of Portland cement should be added to 3 of Selenitic lime,

or Portland cement used alone. Such a concrete base can quite easily be built hollow by using a board slightly tapered: this is drawn up at intervals of about 18 inches, and brick ties inserted. The same plan may most profitably be used in building stone walls. The outer face is built of dressed stone, and the space to boards grouted in with pails of concrete. A brick wall may be built on the other side either solid or similarly grouted. For cottages a cheap wall in stone may be produced by forming a wood frame of 4-inch by 2-inch, or $3\frac{1}{2}$-inch by 2-inch, studs about 18 inches apart on the inside, and by then temporarily boarding this on the inside of the room, and then filling between these boards and the stone facing with concrete grouting poured in by labourers as the mason proceeds with the face. Rough nails driven half-way into the backs of the studs effectually keep them in place, and the studs afterwards serve for fixing joiner's work. This makes a much better wall than the ordinary stone wall filled in by hand with odds and ends and lumps of mortar. Brick facing can, of course, be similarly treated.

A very strong partition for internal work where floors have to be carried is most easily formed of uprights from 5 inches to 7 inches by 2 inches, at least 18 inches apart, with one or two half-inch iron rods run in each storey through the centres. Selenitic concrete is then filled in between the timbers, and the result is that a 6-inch or 7-inch wall thus formed can be obtained at much less than the price of a 9-inch brick wall, and little if at all more than the ordinary lath-and-plaster partition. There must be no cill, but the ends of studs held in place by boards. Of course, in this form of wall the wood might rot away without affecting the stability of the iron and concrete. This same construction can be very economically used when the wall is to be protected by weather tiles, and if the concrete be formed of clean cinders (as from their lightness is often desirable, especially for overhanging walls), the weather tiles can be quite easily nailed into the concrete, and this is an immense advantage. For building with Selenitic mortar, two half bricks with a hollow is of ample strength for cottages, provided vitrified brick ties are used, and not iron abominations. There is one great advantage in such walls, that they must be solid brick, and there is no room for batts and fillings of mortar rubbish. In Surrey, at least, and probably in most places, no solid brick wall will keep out the weather.

Another cheap way is to build a rough 9-inch wall and rough-cast, and this is useful where one can get bad enough bricks. Of course, no self-respecting architect now allows a wood plate or even a wood-brick to be built into a wall, as any bricklayer can make the necessary provision for fixing with a little Portland cement and ashes or breeze used in place of the mortar-joint. If the joists, as in the section given, be allowed to run a little over the front wall, there is no possible occasion for a wall of more than two hollow bricks. The two or three top courses of this can be built solid, and with at least two projecting courses forming cornice that brings the wall to 14 inches at top. Facilities are thus given for a projecting window below and a wide window board—the cottager's delight.

Where weather is severe, there is no better protection than weather tiles, which can be nailed into concrete as mentioned above. Rough-cast can also be most effectively used. This may be simple rough-cast, and for this purpose Selenitic lime is excellent, or may be pebble-dashed. In Devonshire quartz pebble has been used, and in Gloucestershire a bright crystal of barytes found on the spot that produces a charming effect. Timber-frame work, painted black or white, is a very favourite style; but on no consideration should it be used on a S. or W. side. On the N. and E. sides it stands perfectly. Oak is most costly and untrustworthy, and fir is preferable: this should be Burnetized or kyanized, or treated by some process. For facing between the timbers Selenitic lime is a nice, warm, brown tone, but Portland cement can hardly, by any means, be made to look right with a natural surface. If mixed with a little Selenitic it makes an excellent material for relief work.

One cannot advocate too strongly the abolition of the joist and board floor in all cases, and particularly in cottages, where the space between always becomes a hotbed for vermin. If gas breeze or clean-sifted ashes can be procured at a reasonable rate, a floor can be very economically formed. Two light wrought wood girders should be run across the rooms in the direction the joists would take, and the floor formed on them. A 6-in. floor with $\frac{1}{2}$-in. iron rods laid two inches from the bottom of the concrete and every foot apart is sufficient for anything. The beams are probably not really necessary, but would save labour in staging, and act as a tie in place of the joists. The rods may not be necessary, but are a very desirable addition. In repairing old cottages such a plan will be found invaluable, as it allows one to retain and utilise the old oak beams and joists, and procure a level floor without the tedious and expensive process of firring up. The floor can be floated in cement, or boards nailed directly on the concrete; but perhaps linoleum or other material is a much more sensible covering, if prejudice could be got over. In Yorkshire, floors were, within the memory of some living, formed of plaster, laid on reeds; so possibly in some parts of the country there may be less opposition to the plaster or cement surface. Kent, the architect, had put a similar gypsum floor over the oak joists of Waynflete in the remaining gate tower of Esher Place. With regard to stairs,

it must always be remembered that furniture and sometimes a coffin have to be carried up and down.

RESTORATION OF OLD COTTAGES.

In restoring old timber cottages the first thing to do is to get rid of the vermin, usually fleas. To effect this the chimneys must be stuffed with sacks, and all openings stopped as far as possible. Old frying-pans or similar vessels should then be placed on three or four bricks in suitable places downstairs, and be filled with stick sulphur, which must be lighted, and the place shut up for a day or a night. This treatment must be repeated at the end of a week or ten days, so as to catch the new brood—one application is of no use. Between the two fumigations it is very desirable that skirtings should be taken off and floors taken up, if it be intended to clear these out. In cases of very old buildings everything should be moved.

In the case of timber cottages it is essential that the structure should be restored to its true level. It will nearly always be found to have dropped somewhere, owing to the decay of the posts; it is quite easy to put it level again by using screwjacks. In some cases, where the ground has risen around a cottage, or the height is unusually low, the whole framework may be raised; but advantage should not be taken of this to get more than about 7 feet in height, or the whole proportion will be spoilt; a damp course will naturally be inserted. A few years ago, at Wonersh, in Surrey, the writer succeeded in raising 18 inches the upper floor of a long building that had been formed into three cottages. The rotten ends of posts were first cut off, and then, with the aid of ten jacks, the whole building was screwed up to word of command. In screwing up, advantage should be taken of the tile stripping that is generally necessary, and of course the frame must be disconnected from the brick chimney, and the fire openings must be altered. Many old cottages have oak girders and joists which are either exposed to view, or meant to be; the tops of these are rarely level, and firring up gives great trouble. The plan is to clean the joists and secure to girders with iron on tops, lath all over the top, and form a 4-inch to 6-inch floor of concrete of breeze or clean ashes. The only use of the laths is as a cheap substitute for a temporary plank staging, since it must be remembered that in a small building the planking for concrete may easily become very expensive. The great openings of old chimneys, where the bacon once hung, give great trouble. It is easy enough to close the top of the ingle nook and use an American stove, but then there is an enormous accumulation of soot going on that must some day be dangerous. The plan adopted by the writer is to cut out the internal face of the brickwork and build new sides and front to the flue, until the regular 14-inch or 18-inch flue is reached.

9, CONDUIT STREET, LONDON, W., 31*st December* 1896.

BRICKWORK TESTS.

DISCUSSION OF THE REPORT ON THE SECOND SERIES OF EXPERIMENTS.*

PROFESSOR UNWIN [*H.A.*], F.R.S., said he believed he was expected first of all to say a word or two about the Appendices he had put to the account of the experiments. To one of them he need hardly allude at all: it was an account of a further testing of the hydraulic press during the second series of experiments, to determine the friction of the press. The press had improved by a slight amount in the interval between the first and second series of tests; the friction was a little less in the second period of testing. He had given also, for comparison with the previous tests, some tests of the new bricks used in the construction of some piers which had still to be tested. There were also some further tests of the lime and cement used in the piers. During the tests it had occurred to him to make a small experimental research upon the influence of form on resistance to crushing. In the ordinary tensile tests of a bar it had been almost universally assumed that the tenacity of the bar—that is, its resistance per square inch—was practically independent of the form of the test bar. One knew now that that was not quite true; that it was only in geometrically similar bars that one got exactly the same tenacity. In the case of crushing, the resistance depended still more on the form of the specimen crushed. The old assumption that one might take a cube, a prism, or a cylinder, and crush it, and compare the crushing resistances, was to a certain extent a mistaken notion. Quite early, French experimenters proved that, in the case of crushing, the resistance depended very much on the form of the specimen crushed. Bauschinger made experiments on that question some years ago at Munich, and more lately Martens at Berlin had made additional tests. The difficulty of determining the influence of form was that one had to find a material of very homogeneous and uniform quality, so that there were no discrepancies introduced from varia-

* The full text of the Report, with Appendices and Supplementary Paper by Professor Unwin, F.R.S., read at the Meeting of the 14th inst., is printed at pp. 73–103.

tions in the quality of the material as well as differences due to the form of the test block. It occurred to him that ordinary red rubber brick would be very good stuff to use. One could cut it easily into suitable blocks, and it was of fairly uniform quality. He had prepared a table of the crushing resistance of some prisms of red rubber brick, which were square in section and of different heights [p. 102]. When they were one inch in height they carried 125 tons per square foot before they crushed; when they were two inches in height they only carried 87 tons per square foot before they crushed; and when they were four inches in height they only carried 75 tons per square foot before they crushed. That was not a case where bending came in; the prisms were too short to bend. The cause of the variation of strength was a different one. Even in quite short prisms the form of the specimen had a large influence on the crushing resistance. There was a further table of the strength of some rectangular prisms and of the relative strength of a whole and a half brick [p. 103]. The half brick was weaker than the whole brick by $8\frac{1}{2}$ per cent. With regard to the matter more particularly under discussion, he had looked carefully over the results obtained in the last series of tests, and compared them with the results obtained in the previous series. The tests were not complete, but practically the tests of square piers were completed; the further tests to be made were on piers of a different form; so that although he was not going to say anything final about the results, there were one or two points to which he would call attention. Studying those tests, there were two anomalies to be observed in the results. First, that there were a few piers built at a later date than the first: they were built with a different lime, a different cement, and different sand, and they were built with very much greater care. If the piers built at the later date were compared with those built at the earlier date, it would be found that the piers built at the later date invariably carried more, generally twice as much as the piers built at the earlier date. To take a single instance: comparing the gault brick piers in cement of about three months old, the first-built piers carried only 18 tons per square foot, whereas those built at the later date carried 49 tons. Taking the Leicester red brick piers, those built at the earlier date carried 58 tons per square foot, and those built at the later date carried 86 tons per square foot. Taking the Staffordshire brick piers, those built at the earlier date carried 72 tons per square foot, and those built at the later date carried 103 tons per square foot. There was an anomaly which wanted some explanation, and to the interpretation of that some importance was to be attached. In Mr. Max. Clarke's account of the tests he rather laid stress on the fact that more care was exercised in the building of piers at the later date than in building the earlier ones; and he said that they had there a lesson as to the great necessity of care in superintending the building. There was, however, another cause for the discrepancy, and that was the change in the materials of the mortar. He was inclined to think that nearly the whole of that difference was simply and solely due to the difference in quality of the cement or sand used in making the mortar. It was too soon to put that forward yet, because his tests on the mortar were not completed; but from what he had seen in one or two experiments with cubes made at the earlier and later dates there was quite as much difference in his cubes as there was in those piers, and he thought that nearly the whole of the difference would turn out to be a mere difference of the quality partly of the cement and the lime, but chiefly in the quality of the sand used in making the mortar. His first point, then, was that the later series of tests must be classified wholly apart from the earlier series of the different piers; they were not built of the same materials. His second point was that probably nearly the whole of the difference was due to the quality of the mortar. The second anomaly he had referred to was a very curious one, and he could not give an equally good explanation of it. Taking the tests in order, they would find that in some the piers built and tested after four months carried more than the piers after standing for ten months. He could not explain that; it was a very curious anomaly, and he did not know what to make of it. There ought to have been a gain in strength instead of a loss of strength. He should attribute it to the action of the frost, only he did not think that there was any frost which affected the piers after they were built. With regard to the special experiment suggested by himself, of which the drift, perhaps, was not seen, he had suggested that a pier should be built up with no mortar in the joints, but with merely enough sand to make a bed for the bricks, and then to have it crushed. The Committee had been good enough to carry out that test, and he thought the result very instructive. The sand was that used locally—a dry sand, and about a quarter of an inch thick. There was no lateral adhesion at all. On asking the result of the experiment, he was told that the pier did not carry anything at all. He was rather disappointed, but he had since seen the actual result. So far from carrying nothing at all, that pier carried $33\frac{1}{3}$ tons before it gave way, and he thought if any one saw $33\frac{1}{3}$ tons in the flesh in the shape of an iron block he would say that it was by no means a small load for an 18-inch pier to carry. But, further, the pier of Leicester reds built in sand carried a greater load per square foot than the average of the London stocks in lime, either at 18 weeks or at 43 weeks, and not much less than the gault bricks in lime at 18 weeks or 43 weeks; it carried a load which was about half the load of the Leicester red bricks built in lime at either 18 or 43 weeks. It carried a load greater

than the London stocks built with cement after 21 weeks, and very little less than the gault bricks built with cement after 21 weeks. That was a kind of limiting experiment: it showed the result of building a pier with no lateral adhesion of the parts. It carried quite as much as one could expect, and had done very creditably. One other point: a great deal of importance had been attached in the experiments by some of the speakers to the question of the joint in the piers in which there were some closers. The pier in sand was practically all closers. It had no lateral adhesion at all. It had no bond except the slight friction of the bricks on the sand. He did not pretend to infallibility about brickwork, but his view was that too much importance was attached by some architects to the question of the closers. If they had a pier built with mortar so bad that there was no lateral adhesion, then it was a bad thing to have those joints with closers; but if they got good enough mortar with a good deal of lateral adhesion, he did not think it mattered whether they had those closers or not; it was all a question of the quality of the mortar used.

Mr. HENRY DAWSON [*F.*] said he understood that the 18-inch pier built with Leicester reds and with sand joints gave way at 15 tons—actually crumbled away at 15 tons. That was a very different thing from the Leicester reds that they had in cement, which only began to show cracks at 22 or 23 tons.

Mr. WILLIAM WOODWARD [*A.*] asked whether the brickwork was grouted at all with mortar or cement in either of the cases mentioned. The result of the experiments seemed to him astounding. Did he understand from the Professor that, given two piers built at slightly different periods with the same quality of brick, the enormous discrepancy shown was due entirely to the joint? Because if so the observation made as to the superintendence of the work during its progress became of even more importance. Then, too, the statement that the pier that was built, or had been allowed to stand for 10 months, was weaker than the pier that had stood three months was another astounding proposition. In fact, judging from one's experience in building operations, the result of the experiments would lead one to suppose that there must be something radically wrong in the system or method of the experiments; that the pressure brought to bear must have been of some artificial kind, or have been made in some manner not at all conclusive as to the pressure that brickwork would sustain. The accounting for its operation by the Professor seemed to him (Mr. Woodward) to be of the weakest possible description. The Professor had said that he was not acquainted, familiarly acquainted at all events, with the pressure upon brickwork; and in that case Mr. Max. Clarke should inform the Meeting of something more definite than the somewhat superficial reasons which the Professor had given for these enormous discrepancies. It upset the whole theory of their experience in brickwork. The Professor or Mr. Max. Clarke should give more particulars as to the character of the brick; whether the sand was Thames sand or pit sand; as to the thickness of the joint, and whether the brickwork was grouted—in fact, they should give more of those details which architects who wanted their work properly executed were in the habit of looking into.

Mr. WILLIAM WHITE [*F.*], F.S.A., entirely endorsed Professor Unwin's observations upon the necessity of having good sand, and related a little experience of his own in the case of a small vestry in the country, which cost some £70 or £80. When finished, it showed signs of settlement, and the builder, a local man, insisted that it was due to the construction of the windows, which lacked sufficient abutment to carry the arches, and also to the weakness of the roof making the walls to spread—the walls had gone out an inch or two on each side. He (the speaker) insisted that the quality of the mortar was at fault; that the construction had nothing whatever to do with it. The builder called in a local man, who styled himself a surveyor, and who made a report stating that the matter must be submitted to arbitration, for the construction was in fault. Instead of replying, he (the speaker) sent down a clerk of the works whom he could trust to examine the work. He had the work taken down by the builder. The mortar proved to have been made with the old mortar powdered up. It was reconstructed just as before, only with proper ordinary sand and lime, and it stood perfectly well. The experiments seemed to emphasise the fact that it was the closers which formed the weak point and which diminished the strength of the piers enormously. He had had piers constructed without closers. That was a difficult thing with 18-inch square piers, but with 2 in. bricks by 2½-in. bricks it was very easy to construct piers with a proper bonding throughout, only one could not break the joint just in the ordinary way of English bond. The rigid but needless uniformity of bond in alternate courses must be abandoned. Constructed in that way he was quite sure they might be made much stronger. He should like to see that experiment carried out—two equal piers, one with closers and one without.

Mr. P. GORDON SMITH [*F.*] said it had been very gratifying to the Committee to find that one of the Allied Societies, the Sheffield Society, had taken a keen interest in their experiments. They had been furnished with a set of bricks similar to those experimented upon by the Science Committee, and they had placed them in the hands of Professor Ripper, of the Sheffield College, who had prepared a table of results. They differed only slightly from the Science Committee's results, and showed that Sheffield stock bricks were much stronger than the London stocks. Earlier in the

year, when giving the results of the first series of experiments, something had been said about the money to carry on the work, and it might interest members to hear how the money had been spent. They had had some 50 yards of railway to construct—rails and sleepers upon which to move the piers into the testing machine. They had used some 15,000 bricks of one sort and another, some few yards of lime, four tons of cement, and so on, besides the labour; so that it was easy to see where the money had gone. Before sitting down he should like to ask the Institute to record their acknowledgments to Sir William Arrol for the use of the powerful testing machine. They could not possibly have conducted the experiments without it, and he had very kindly placed it entirely at their own disposal for these experiments. To Professor Unwin, of course, they owed very great thanks—in fact, the experiments could not have been initiated without him, and he had given much valuable advice throughout. They were also greatly indebted to Dr. Longstaff, who had helped them with money to carry on the experiments, and to Mr. Donaldson, the Engineer of the Docks Company, who had afforded them great help on the spot. To all those gentlemen their best thanks were due, and he had much pleasure in moving a very cordial vote of thanks to them.

Mr. JOHN SLATER [*F.*], B.A., in seconding the vote of thanks, said that Mr. Woodward seemed disturbed in his mind because the results of the experiments were so entirely different from what he expected. He was inclined to think that Mr. Woodward had in him a good deal of the spirit which actuated the old Inquisition when Galileo found out that the earth moved round the sun; they told him that it did not, and that if he said it did he would be executed. It appeared to him that Mr. Woodward would like to execute Professor Unwin because he had come to an opinion so diametrically opposed to what they had been led to expect. But as a matter of fact this was the first time that experiments of this nature and on this scale had been carried out at all, and it was by no means wonderful that the results of those experiments should go to show that the old rule-of-thumb upon which they had been going was not correct. One of Professor Unwin's most interesting experiments was that which showed that the form of the compressed surface had a good deal to do with the pressure it would stand. It had always been the custom to provide a base for a column or stanchion of a certain thickness; but it now appeared—if the Professor's experiments could be relied upon, and there was no reason why they should not—that they were probably making a great mistake to increase the thickness of the base when it had to carry a certain weight beyond a certain point. Of course there must be some limit, some minimum thickness; but the Professor's researches showed that to go beyond a certain thickness was to increase the liability of the compressed surface to crack. It had occurred to him while listening to the remarks, and looking at the illustrations, whether it was possible that the introduction of closers having an effect upon the pier was due to the fact that these particular closers were considerably higher compared with their area than the rest of the bricks. If the piers were weak where the closers occurred, might not the fact discovered by the Professor have something to do with it? Because a brick had a less height compared to its area than the closer had, and that might have some influence upon the piers. One could not, of course, help observing the enormous mass of discrepancies the results showed as to the weights the piers sustained; and Professor Unwin, he was sure, would agree that it would not be wise to calculate too precisely; but he thought one conclusion at least had been come to—that brickwork in mortar and brickwork in cement, if properly constructed, would carry much more than they had supposed. An ordinary wall properly built would never have to sustain anything like the crushing weight that would cause the wall to fall simply from its own structure, mortar, &c.

Mr. HUGH LEONARD [*H.A.*] said that the experiments, although they presented many discrepancies, afforded a great deal of useful information. The sub-committee who had carried out the work deserved the greatest credit and the best thanks of the Institute. He had been present during some of the experiments, and he believed that the general body of members could hardly appreciate the amount of work that had been done by the Hon. Secretary and the other members of the sub-committee. It was a pity that at the beginning the first piers were not constructed as carefully as they might have been; the defective work came quite as a surprise; but, taking both sets of experiments—the piers which were and those which were not carefully constructed—a great deal of useful information had been gained.

Mr. HENRY DAWSON [*F.*] said he should be sorry if members went away with the idea Mr. Slater had put before them, because his own conclusions were quite different. He considered the figures of the two sets of experiments, if carefully examined, would show it to be the reverse of what Mr. Slater said. These recent experiments, he submitted, distinctly showed that brickwork, as had been described that evening, would not carry much more than one half of what they had been accustomed to believe. That was a very important result. With regard to the material called "London stocks," he considered such description a misnomer, for there was scarcely any such brick nowadays as a true London stock. The bricks used in both series of tests, and called London stocks, were not London stocks, but were similar to the larger number of those now used in London, and which mostly came from Kent, near and beyond the banks of the Medway. In his own

practice for some years he had forbidden their use in any important building. As to the stock brick piers in the experiments, if the results were carefully examined, it would be found that they did not bear safely, when built in lime mortar, more than about five tons to the square foot; nor, before they began to crack seriously, more than about seven tons; that still more serious cracking took place at ten tons, and that they crushed altogether at about twenty-two tons. He had to make some experiments many years ago with "London stocks" in comparison with gault bricks, and the former were true "London stocks," made in one of the well-known brick clay fields around London, and the "gaults" were made at Arlesey, in Bedfordshire. In those experiments they tried six different lots of London stocks and six different lots of gault bricks, and the average result was, that no serious cracking in the stock brick piers took place, that is, when the pier would be of no further use, until the weight per square foot reached twenty-six tors, and in the case of the gault brick piers until the weight reached about fifty-four tons. That showed most palpably the difference between the real London stocks of former years and the so-called London stocks of the present day. The size of the piers in the experiments referred to was, he thought, 14 inches square; they were low piers, but all alike, and, therefore, it was a fair comparison. In his opinion the best stock brick now made in the neighbourhood of London, and the best substitute for the former London stock, were those called "Cowley stocks," and made in the district between Southall and West Drayton, Middlesex. He was confident that if the Cowley stocks were tested, they would yield a very different result from the stocks used in the recent experiments.

Mr. BERESFORD PITE [*F.*] asked whether the Committee would favour them, through Professor Unwin, with a little further information in one instance—viz., as to the specification or analysis of the sand. It seemed to him so much depended upon the sand that it would be of the greatest interest if that information could be given. Again, might they hope to be delivered from the rule-of-thumb method of calculating safe loads? The experiments would be practically useless unless some efficient and satisfactory guide were given for ascertaining safe loads from the results arrived at.

The HON. SECRETARY asked whether note had been taken of the difference in the crushing load if bricks were used with frogs or without. Also, as to the ten-months-old piers, in which the mortar or cement would be set hard, whether the comparatively sudden application of pressure by the ram caused them to fail under a less weight than would be the case if the load had been gradually piled on while the piers were green, as in the ordinary course of building.

Mr. F. T. READE [*H.A.*] said he would make a few remarks on a point not touched upon by the Science Committee—viz., the bedding of stanchion bases on bed-stones, and the bedding of these bed-stones on the piers. They would have noticed in the report of the first series of experiments [Vol. III. pp. 341–2] the precautions taken to ensure a fair distribution of the pressure over the whole area of pier, and it was to this matter he particularly wished to call attention. Several cases of failure from the neglect of such precautions had come under his own observation. He selected two of them. The first occurred in Liverpool. His firm had designed the ironwork, and given sizes of piers for a large stone-fronted building, and the builder's work was let in two contracts, so that there was an interval of nine months between the building of the piers and their failure. When the building was partially occupied, several reports were received from the architect that the iron stanchions were not quite vertical over the piers, and he thought this deviation from the perpendicular had occurred since the completion of the building. He went to Liverpool, inspected them, and found the stanchions were from $\frac{3}{8}''$ to $\frac{5}{8}''$ out of the perpendicular, and also that some of the piers inclined inwards to the extent of $\frac{1}{2}''$; but after a careful examination of the bases and bed-stone joints, and also knowing that a low limit of pressure on the piers had been taken—viz., 8 tons per foot when *all* floors were loaded—he concluded they had been built so; that it was bad workmanship, but did not greatly matter. About a month after this visit he received a telegram: "Building failing; come on at once." On his arrival in Liverpool the same afternoon, he found that a pier $40\frac{1}{2}'' \times 36'' = 10$ feet area, and whose load when every floor was loaded was about 82 tons, or 8 tons per foot, had developed large cracks on two sides about 18″ and 9″ from one corner. The bed-stone, 12″ thick, had three cracks quite through the thickness of the stone, and the building was evidently in a very risky condition, especially considering that the floors were mostly unloaded, and the actual load then on the pier was only about $5\frac{1}{2}$ tons per foot. It may be noted that the experimental pier built in sand at Professor Unwin's suggestion failed at about the same pressure. After taking immediate precautions against accident, and consulting with another engineer—various patching processes were discussed (to all of which he, Mr. Reade, objected)—it was at last decided to take out and rebuild the pier. He need not describe the processes adopted; they were quite successful, and the pier was removed. The bricks were good, hard bricks, and the mortar (made with local limes, slightly hydraulic) was apparently excellent. The mortar joints were so hard on the face of the pier that one could only just scratch it with a knife; but about $4\frac{1}{2}''$ in from the face it had never set at all, and had no more cohesion than if it had been sand, so that the inner portion of the pier was little better than a loose pile of

bricks. The bed-stones were got out as carefully as possible in five pieces, and it was found that the stanchion base had been very imperfectly bedded on a thin smear of cement, and the base only bore on about five points of very limited area. That accounted for the fracture of the stone, and that having given way, it began to press on the loose central cone. This in its turn pressed out the sides of the brick box, and produced the ominous cracks on two sides. The concrete was found to be all right, and the pier was rebuilt the same size with new harder bricks in cement. As an object lesson in shoring, he might mention that in the hurry of the business he put in the crosshead (on which the iron was carried on the vertical shores) of pine 12″ × 12″—its span was only about 36″—but when the load of about 58-60 tons was on it, a series of annular cracks showed at the ends that were very unpleasant to see. This crosshead ought to have been sound oak. The second case was in London in a large block of residential chambers, pier 45″ × 45″ = 14 ft. area, total load 114 tons, or 8 tons per foot, actual load at time of fracture 55 tons, or 4 tons per foot. The bed-stone, 12″ thick, was cracked in two places, right through—crack widest at base. A very wide crack in the top course of brickwork followed from the same point, and, passing through the line of closers, tapered off to a fine crack about 24″ from top. The first cause of failure in this instance was the absence of any real cement bed between the stanchion base and the bed-stone, the former bearing hard on the stone at one side and a bare ¼″ thickness of cement on the opposite side. The joint of stone on the brick pier was very similar. On one side the stone rested on the bare brickwork, no cement showing, and only about 3/16″ thickness of cement on the opposite side. The thinner side of the cement joint between stanchion and bed-stone, and bed-stone and pier, were below one another. The crack in the stone, being widest towards the bottom, showed a slight sinking of the broken part toward the centre, which caused a lateral split in the brickwork, the crack in which at the top was of equal width to that at the bottom of the bed-stone, and in the worst case disappeared at 12 courses down from the top of piers. The brickwork, though assumed to be built in cement, was pulled down with little difficulty, showing that the cement had not set thoroughly, and was probably of inferior quality or gauged too weak. There was no clerk of works on the building. Although these two piers were complete failures, they were of ample strength, had the bedding of stanchions, bases, and bed-stones been carefully done. From these two startling examples, he hoped that all architects would come to the conclusion that it was impossible to give too much care and attention, not only to the building of the piers themselves, but also to the careful bedding of stanchions, bases, and bed-stones on the brickwork. And in all cases where it was practicable to make the base of the stanchion or column of sufficient size to transmit the load direct on to the brickwork, and its edge not more than 2½ inches from face of pier, it was of advantage to omit the bed-stone, for one bed joint, a possible source of failure, was thereby saved.

Mr. BRUCE J. CAPELL [*A.*], speaking as to the time during which the load was acting on the piers, remarked that it had been suggested that the sudden application of the load must have had something to do with the failure taking place earlier than it would otherwise have done. He, on the other hand, would ask whether it was not very probable that the piers would have failed under a lighter load if it had been pressing thereon for a longer period. He put his ear to some of the piers as the pressure was applied, and, long before the failure, heard a peculiar cracking noise, and his idea was that if the pressure had not been increased, but had merely continued, the piers would have failed under lighter weights than those recorded.

The PRESIDENT said it was very unpleasant to find that the old theories they had worked upon were no longer tenable; but that was the effect of scientific investigations. There were many points about the tests which required elucidation. In the first place, a good number of the bricks with which every pier was built ought to have been tested, so as to discover what the average of them would bear. Bricks of the same sort were by no means all equal in strength, and it was quite possible that the best and worst specimens of each sort greatly varied; the London stocks, the Leicester reds, and the blue Staffordshire might have varied greatly in their capacity for bearing loads. There was another point, as regards the mortar—it was the fashion now to call cement mortar too. A good deal had been said about the sand. It might be the cause of the irregular results, but, to be sure, they wanted to have experiments made on that. They also wanted to know the proportions of the elements of which the lime was composed, the way in which it was burnt, and its weight. And then they also wanted to know the proportion in which the sand was mixed with it. He had some experiments made years ago with lime mortar. The lime was chalk lime, without enough alumina in it to make it hydraulic; and the sand was pit sand, almost as fine as flour, and with yellow clay dust amongst it. He found a great difference in its cracking strength, according to the proportion in which the sand was mixed with the lime. The mortar was accurately measured and mixed: it was set in moulds 1 inch cube, and tested between 137 and 144 days from being mixed and put into the moulds.

	Cracked.
2 parts sand to 1 lime	63 lb.
3 „ „ „ „	106 „
4 „ „ „ „	114 „
5 „ „ „ „	59 „
6 „ „ „ „	30 „

The crushing weight was but slightly in excess of the cracking weight. The exact proportion was the one point that very few of them took the trouble to ascertain—whether sharp sand had really much influence on mortar had to be proved. If the lime, as was believed, dissolved a certain proportion of silica from the sand, it was important that that sand should not be mixed with earth. When they had got the proper proportion of sand to lime, they wanted to know the effect of time on the hardening of the mortar. In an 18-inch pier, if the air was to bring in a certain proportion of carbonic acid gas, they wanted to know how far it got inwards in a certain time, which was not, he thought, to be calculated by months, but by years, if not by centuries. The excellence of the workmanship had much to do with the strength. The late James Walker said, "The cause of failure is always bad workmanship." Mr. Pite wanted to have a rule by which the safe load could be calculated from the breaking weight that was found by experiment; the present rough rule was one fourth. Such a rule, he thought, was impossible to be obtained, for these reasons: One must not only know that the materials used in the building are equal in strength and other qualities to the material used for the experiment, but that the workmanship of the brickwork in the building was equal to that in the experimental piers. They had been told that the bricklayers who built the experimental piers put in closers of common stocks, to save themselves the trouble of cutting the blue Staffordshire bricks. Think, then, of the work done by an ordinary bricklayer in ordinary work where no particular supervision was exercised! As a rule, the cross joints of brickwork were never wholly filled up—sometimes from mere carelessness of the workman, but quite as often from variation in the size, and the irregularity of the bricks. When a joint was from ½-inch to ¾-inch wide, if a careful bricklayer were employed, and the mortar were not too stiff, it could be chopped in with the trowel; but where the bricks almost touch, unless the brickwork is well and properly grouted, no mortar could be got in at all. They must remember that a bricklayer could not take the time to cover the whole vertical face of each brick with mortar. Nor if he did so could he make both faces fair. If the face of one brick were full of burrs, or the brick were twisted—a common fault in all stock bricks—he must then have a thicker joint. All these things tended to show that it was quite possible that the cracking or the crushing weight must almost of necessity greatly vary in experiments, and would vary still more in ordinary work. Another experiment was wanted for each, *i.e.* the cracking and crushing weight of an 18-inch cube, so that it might be seen if binding stress came in when the pier was four times its lateral dimensions, *i.e.* if piers six feet high were found to be weaker than 18-inch cubes. If they were, then experiments on higher piers were wanted, so tha a formula might be deduced for piers of all heights, as was done in the calculations of the strength of columns. He was not prepared to say that a perfectly level surface of cement was not the best surface for bedding brickwork on; but at the same time he would rather have had experiments made as to which was the best bedding. When trying experiments on cubes of stone, brick, or concrete, one mostly used ¾-inch stuff of soft pine; some people used wash-leather, and some lead. Professor Unwin had mentioned in his book that lead was a very bad material indeed; but people of his (the speaker's) age knew that it was the universal practice to put lead between all the bearings of iron on iron, or iron on stone, and old stone columns might be found with the lead of the joints projecting before the column. Cast-iron plates, more especially if they were cast on to a stanchion or column, were almost always hollow, and should, when it could be afforded, be faced in the lathe. If that hollow was not perfectly filled up, instead of getting a uniform pressure on the part beneath, it was got round the edges; or if the surface was not smooth, they got it on small points; and if it had a caulking, the mortise cut in the stone must be sufficiently deep to prevent it touching. As a schoolboy, he remembered seeing a pier in a warehouse which had cracked in all directions directly the warehouse was loaded. The floor and stanchion above were shored up, and the pier pulled down, and then it was found that the mortise in the stone was too shallow for the caulking, so that the whole weight of the floors above was concentrated on the middle of the stone by means of a caulking 1½ inch square: this had split the stone, turned up the edges, and forced the middle down, and so split the pier. When the pier was rebuilt the same size as before, it stood, and, so far as he knew, it stood to the present day. Procopius mentioned that at Santa Sophia they did not use mortar or asphalt, but ran the joints with lead, which, Professor Unwin said, was the very worst possible method of getting security. Procopius, like most historians, did not even take the trouble of asking one of the architects why settlements took place; but he asked all sorts of other people who knew no more about it than he did himself. Procopius spoke of the excellent advice Justinian had given to the architects, which turned out most admirably. They would remember the kind of Court there was in Byzantium, and that this was done purely to flatter the Emperor. In his younger days he had himself made a great many experiments in a rough way. All his experiments were made on 9-inch cubes of brickwork, which bore over 17 tons, or about 31 tons to the foot superficial. The bricks were London stocks set in Portland cement, the cubes weighing on the average 42½ lb., and had been set for about eight months; they were crushed in the press between ¾-inch pieces of soft yellow

pine, and he found that 9-inch cubes of malm paviors in Portland cement bore very much less—*i.e.* about 14 tons, or 25 tons per foot superficial. One other subject he would mention—viz., Gault bricks. They were very pretty to look at, and under pressure bore considerably more than the stock; but they were a most detestable brick to use. Under certain conditions (what those conditions were he could not say) the faces flaked off like slate, many of the walls on the platform level at the stations on the line from Baker Street to Harrow having had to be refaced in his time.

PROFESSOR UNWIN, replying to Mr. Emerson's inquiries, said that, so far as he knew, a frog in the brick was a distinct cause of weakness. As to the second question, the element of time acted in this way: that the more slowly the test load was applied the lower was the crushing load. The loads were not applied very quickly in these tests, and he did not think it would have made a great deal of difference if they had extended the time of applying the load over one hour or two hours or more, instead of the time that was taken; but still the element of time was one in that direction. If they applied the load with velocity that was another thing, with a falling weight for instance. The load was applied in a way which they might call slowly; but if they had applied it much more slowly they might have had a slightly weaker crushing load.

Mr. JOHN CODD [*A.*], writes:—It is disappointing to learn that the later experiments on the strength of brickwork have been conducted on the same lines as the previous ones. It may be interesting to learn with how little power it is possible to crush a pier of brickwork confined between two metal plates; this, however, is not what an architect is usually called upon to do. The practical question is, What is the load per foot superficial which can safely be put upon a pier or wall? Upon this question the experiments made appear to have but little bearing.

Mr. WILLIAM C. STREET [*F.*], Hon. Secretary of the Science Committee, writing since the Discussion above reported took place, says:—

In presenting everything connected with the tests as fully and accurately as possible, deferring reasoning or explanations till later on, we have aroused much criticism from members who have not attentively followed our proceedings and studied the tabulated results.

The table of averages has given occasion to many remarks, though we have already explained that the discrepancies are the result of the different qualities of workmanship. The remarks and footnotes to the tabulated results of Piers Nos. 12, 14, 16, 27, 28, 30, and 32 are sufficiently descriptive of this. One of the worst characteristics of bad workmanship is its irregularity; and while we are willing to face the bad or ordinary method as affording the safest guide in fixing rules as to strength, it is difficult to fix the limits of badness. There is no great temptation to vary the character of work in soft bricks, and if Pier 1A is taken away from the column for stocks, as being built in a superior manner and such as we shall never get in ordinary practice, the averages for that description of brick come out remarkably well, and it will be easy to fix the safe loads. The third series of tests, though upon what we believe will prove very superior work, should offer many comparisons between the different varieties of brickwork, and assist us to assess the value or strength of "ordinary" work in each description.

The proceedings of the Committee, as indicated by Professor Unwin, should have further importance than merely ascertaining the crushing resistance of certain brickwork piers; the form and dimensions of wall, the proportions of the mortar, the quality of the cement, lime, and sand, are all matters that immediately concern the strength of our work.

NOTES, QUERIES, AND REPLIES.

"Stucco Lustro" [Vol. III. p. 500].

From R. F. CHISHOLM [*F.*]—

In his article on "Stucco Lustro," Mr. William Scott says: "I am assured that when this stucco is executed with shell lime and marble dust, the white is absolutely unchangeable," and the Editor adds in a footnote: "This is the famous chunam used in India, a beautiful example of which may be seen in the great columns of the ball-room at Government House, Calcutta." It may be worth while to mention that the columns alluded to were not executed locally with powdered marble; they were executed many years ago by men and materials sent by me from Madras. In Northern and Central India the polished chunam is finished, as described by Mr. Scott, with powdered marble; but in Madras it is finished with a fine white quartz sand, found in the bed of a stream at a place called Amajigghery. The Madras work is considered so far superior that Government, as I have mentioned above, incurred the expense of importing both men and materials from Madras. Here in Baroda, before coating the surface of the Durbar Hall, I put both processes to the test by letting the North-West men with powdered marble compete with the Madras men with powdered quartz sand. The result was altogether in favour of the Madras work. The walls alluded to have now been executed nearly ten years, and the surface is purer and apparently more translucent than the surface of the white Carrara marble columns in the same hall. Leaving the materials out of the question, there is a sleight-of-hand knowledge required in pumicing on the dry quartz-sand, when and how hard to

rub with the polished agate, and, above all, when to leave off rubbing. Still, all Indian workmen agree that their process cannot be accomplished with powdered marble.

Baroda, 1st December 1896.

The Fellowship Question: a Plea for Sweet Reasonableness.

From Frank Caws [*F.*]—

"The old order changeth." The Royal Institute of British Architects may not escape or evade this law of existence. There can be no standing still. Life involves motion, and all motion is revolutional. But sometimes the wheels gird, and the axle bearings whine; and then those who hold the reins have a more or less uneasy time. It is just so now with the Council of the Institute.

A certain German writer, who deified Friction, gave expression to this apparently profound idea: "*Life is unrhythm, death is rhythm!*" It may be some comfort, to those who accept that doctrine, to see in the disturbed, not to say warlike (!), state of mind now obtaining with the members of the Institute on this vexed Fellowship question evidence of so much "life" in our midst. We, in this age born of all the ages—that is to say, in this *period of roller bearings*, which may literally be styled the cycle of all *cycles* (!)—we are not Friction-worshippers; for while we know there can be no progress without resistance, we have also learnt that by minimising resistance progress can be marvellously facilitated. And we see that this, which holds good for the gay crowds of the young and fair, who make our highways hum with bright life, and help to restore to us "Merrie England," holds equally good in many other ways.

In this view of the case, it may be well for those members of the Institute who revel in dreams of fight with fancied "oppressors," and who, delighting thus in "beating the air," welcome a "breeze" in the counsels of the Institute, to reflect that the Institute is like a man whose strength is limited, and whose real advancement will be better served by reducing than by accentuating friction. Storms there must be, and volcanic eruptions too, in this world—yes, even in this beautiful little professional sphere of ours. But it is the sunshine and gentle rain which make the branches flourish and bear fruit; and it must ever be the gentleness of art, and not the ravages of the self styled "reformer's" broom, which will make our Institute great.

For the Institute this is a transitional period; and, as architects, we need not revert to philosophy or political history; for, in our own province of archæology, we have ample illustration of how beautiful a transitional period may be. Could anything afford us modern architects a better example of gracious behaviour through a time of change than those dumb stones so well built together when the richly romantic Norman architecture was slowly yielding place to its keen young Early English successor? Dumb they are, yet eloquent of example to those of us who have passed the Associates' examination, and thereby taken our place in the Institute as members of the new order; for these Gothic pointed arches, blunt as yet, but instinct with that spirit of aspiration which was fully realised centuries later—these arches are not defaced, but glorified, by their zigzag ornament proclaiming their Norman extraction, and proving them no mere *parvenus*. Ought we not herein to learn to be proud, and not ashamed, to associate ourselves with members of the old order, men who have not passed the Associates' examination, but have designed and erected noble and admirable architecture? Ought we not to remember that Ictinus, Buonarotti, and Wren, to say nothing of the great men living with us yet who never passed our examination, would themselves, according to the mistaken zeal of some amongst us, have been blackballed had they been proposed to us by our appreciative Council?

Although blackballing is an institution in most English clubs, there is something essentially ignoble and un-English about it. The most deserving men are, as a rule, handicapped by their modesty, while quacks and humbugs are ever too ready to step boldly to the front. Some strong check is surely needed to prevent the ranks of the Institute from becoming filled with the latter rather than the former class of members. But blackballing is (as recent history of the Institute elections is said to have proved) a means of checking the entrance of good men, and is doing much more harm than good by the systematic way in which it has lately been levelled, without respect of persons, at all candidates who have not passed the Associates' examinations.

The Council are responsible to the Institute for the suitability of the men proposed for election as members—whether as Associates or as Fellows. But the Council, as at present informed, cannot possibly in all cases make sure of the suitability of the men they recommend for election. An idea has lately been submitted to the consideration of the various Allied Societies of provincial architects which seems invested with much practical wisdom. This idea is that the Councils of the Allied Societies may recommend to the central Council of the Institute candidates known to be suitable. There can be little doubt that, by means of such combination of the provincial councils with the central Council in the work of selection of suitable men, much greater discrimination would be observed than the central Council, from their limited knowledge of provincial architects, could well practise in their unaided selections; while in the case of London architects the London Council, assisted by the London Association, would possess information enough to guide their judgment. Perhaps the Blackballing Brigade, if they may be so designated, would

readily signify to the central Council their willingness to abstain from blackballing candidates formally nominated, not only, as heretofore, by the central Council, but (in the cases of provincial architects) by the Allied Societies also. If such an understanding were reached, and loyally observed, that would, for the present at all events, permit of the enrolment of many excellent architects in the ranks of the Fellowship, so as to greatly strengthen both the influence and finances of the Institute.

It may seem pitiable that the inexorable financial necessity should have a deciding influence in the question of Fellowship now at issue. But it is the financial force which decides everywhere the fate of Societies as well as of individuals; and those amongst us who have hitherto, out of over-zeal for the enforcement of the examinational test, made use of the black ball, will in future do well to remember that the Institute, in its still unchanged state, is the parent, while the Test is the offspring; and, according to the fitness of things, the child must wait till the parent has died a *natural* death before coming into his full inheritance.

The laudable desire felt by those who were among the active early promoters of the system of examinations for the arrival of the day when the Institute shall feel itself able to make the long-looked-for "DECLARATION" [that henceforth none may enter the ranks, either as Fellow or Associate, without passing the Associates' examination], this desire, so ardently shared by the great majority of Associates and a large number of Fellows, cannot just yet be gratified; and in patience, as practical necessity dictates, we must possess our souls, not forgetting the adage, "The more haste, the less speed."

It is to be hoped that meanwhile the blackballing may give place to some such working understanding between the Architectural Association in London and the Allied Societies in the provinces and the central Council as shall enable the latter to carry on the work of the Institute creditably, to the satisfaction of Fellows and Associates alike, and to the general advancement of the interests of the architectural profession, without being further embarrassed by such difficulties as lately have confronted the Council.

But if, in spite of more moderate counsels, a clique of members should still persist in attempting, by a cowardly system of blackballing, to force the Council and the Institute to make the proposed "DECLARATION" before the time is ripe for it, a change of the By-laws will become imperatively necessary, such a change as can be constitutionally made by a vote of Fellows only, whereby the Council should be empowered, not only to select and propose, as now, but to *elect* in future all members, whether Associates or Fellows, such elections to be subject to veto, by a clear majority of not fewer than thirty-seven votes (*i.e.* one more than thirty-six, the number of the Council), at the first Business Meeting following the election; and, failing such veto, the elections by the Council should be held as confirmed.

No such change of by-laws would be needed if all members would endeavour in the present transitional period to show a little more of that sweet reasonableness for which the above is meant to be a plea. The writer commends this view of the situation to those particularly who, having subjected themselves to the examinational ordeal, resent the election of Fellows over their heads, who (for aught the said Associates know to the contrary) may have purposely evaded the same ordeal. The writer warmly sympathises with Associates who feel so; and it is to them he would appeal the more earnestly, because he believes the patience which he advocates would best secure the advancement of those higher interests of the profession which we all have at heart.

Sunderland, 20th Dec. 1896.

The Great Mosque of Damascus [p. 25].

Sir Charles Wilson, whose measurements of the Mosque of Damascus, made in 1865, formed the basis of the plan of the Mosque given in Fergusson's *History*, has forwarded to Mr. Spiers the following interesting extracts from his diary:

December 20th and 21st 1865.—Making plan, and taking photographs of the Mosque at Damascus.

The Mosque is on the south side of a large open court, and is divided into three aisles by two rows of columns. In the centre is a transept, having in its middle a small dome supported by four massive piers. The south wall of the Mosque is of solid masonry; the northern is formed by a row of arches carried on square pillars, with the intervening spaces, which were once open to the court, roughly closed. In the eastern part of the Mosque is the shrine of St. John, standing, it is said, above a cave in which is the saint's head. In the shrine is a cenotaph, covered, in the usual manner, with richly embroidered cloths or shawls. Within the Mosque are two fountains and a well. Most of the pedestals of the old columns remain, but in a sadly mutilated state; and a large number of the original columns are apparently still *in situ*. This is specially the case in the *western half* of the Mosque, which is by far the best preserved. In the *eastern half* several columns of smaller size have been used, and in some cases they stand on fragments of the original columns (a shaft 6 feet in circumference stands on the old shaft, which is 7 feet 1½ inch in circumference, and broken off about two feet above its base). In the *western half* most of the original capitals remain, but many are so injured that they would appear to have been thrown down and replaced. All these capitals are Corinthian, similar

to those of the Kubbet-el-Kitab. In the eastern half there is a variety of capitals: two at the S.E. corner are Ionic; the two enclosed in the shrine of St. John are of late date; and many of the Corinthian capitals, which have been taken from other buildings, are too small for the columns on which they stand. Above the capitals are architrave blocks of a single stone each, and over these are stones which take the springing of the arches, and are cut to their curve; thus the arches, which are circular, are carried a little beyond the semicircle. The western half being under repair, and the plaster and whitewash being scraped off, the character of the masonry could be seen. The principal entrance to the Mosque leads from the court to the transept, and is very fine.

Round three sides of the court runs a cloister the arches of which are semicircular, and carried on square pillars and columns. The columns have Corinthian capitals and architrave blocks, and above them is a range of smaller arches as in the Mosque. In the north-west corner are four capitals, which appear to be Saracenic. There are three main entrances from the city to the court. One in the *east wall* has a porch and three doorways, of which the central door is covered with delicately worked brass. The Arabic inscriptions are in brass, and in the modern (not Kufic) character. On one of the columns is a mutilated Greek inscription. On the *north side* is a large single doorway, of which the door is similarly ornamented with brass. In the *west wall* is the third entrance, with a large central and two smaller side doorways; the porch is rather deeper than that of the entrance in the east wall. From this doorway a colonnade extends to the remains of the great arch and pediment; the capitals of the colonnade are plastered over, but enough can be seen to show that they are Corinthian. Opening directly into the western half of the Mosque, through the south wall, is a fourth large gateway, in front of which a similar colonnade can be traced for some distance. Several capitals and fragments of shafts were lying about in the court; and some of these shafts as well as some of those in the cloisters are of granite.

At the eastern end of the court is a small octagonal building, in which clocks are kept, but they had all run down. In the centre of the court is a fountain with four columns on which are Corinthian capitals, and the shafts of two columns used for the illuminations at Bairam. In the N.W. corner of the court is the Kubbet-el-Kitab, a small domed structure, supported on eight columns, with Corinthian capitals; in the dome were said to be fragments of MSS. in Kufic.

On several portions of the Mosque, the Kubbet-el Kitab, and the cloisters are large fragments of mosaic work (houses and arabesques), but not nearly equal, either in design or execution, to those in the "Dome of the Rock" at Jerusalem. In some places are patches of faïence work: the designs on the tiles are for the most part identical with those of the tiles in the "Dome of the Rock," but not with those of the best tiles in that building. The marble decoration inside the Mosque is similar to that in the Mosque el-Aksa at Jerusalem.

At the N.W. corner of the court are two small chambers, in the inner one of which is a Greek inscription. The inscription is on the lintel, and there are nine lines on the inner and five shorter ones on the outer face.

Outside the Mosque, and near the centre of the south wall, there is an old entrance: it consists of a large central gateway and two side ones. The top of the eastern doorway is just visible, and the western one can be seen by looking down a hole in the roof of a chamber. To this chamber there appears to be an entrance from the Mosque, but we were not allowed to visit it. The top of the central gateway rises a little above the rubbish; the ornamentation reminded us very much of that of Baalbek. On the architrave is the Greek inscription, cut on it at a later date; the last word is on a lower line. No trace of this gateway could be seen inside the Mosque, but it lies at the east side of the transept, as well as could be ascertained, in the position shown in the plan. At the S.W. corner, and along the western end, are traces of older masonry and more classic decoration, of which a photograph was taken (No. 13, Pal. Exp. Fund Series).

A short distance from the Mosque, and opposite to the west entrance to the court, are the remains of a large arch and pediment; on the east face the ornament is in tolerably good preservation, but on the west face it is quite obliterated. The style is the same as Baalbek. This also appears to have been a triple gateway.

At the east and west ends of the Mosque are several chambers. At the west end one of these opens into a small mosque; at the east end one gives access to the minaret at the S.E. angle. There are other minarets at the S.W. angle, and in the centre of the north wall of the enclosure.

It is difficult to determine to which buildings the existing remains belong. The gateway in the south wall of the Mosque, and the arch and pediment in the bazaar on the west side, apparently belonged to a temple of the age of Baalbek, and not to the church; whilst portions of the southern and western walls of the enclosure seem to be of much older date. A good deal of the church possibly still exists in the Mosque, which from its orientation appears to have followed the form of the church. The small *mihrabs* are cut out of the solid masonry of the south wall. C. W. W.

Writing to Mr. Spiers on the 30th ult., Sir Charles Wilson says: I find from my diary that on the 23rd December I took the plan into the Mosque, after it had been plotted, and compared it

on the ground, correcting a few inaccuracies. The same afternoon a heavy storm of sleet and snow commenced, which lasted, almost without intermission, till the 28th, when we left Damascus. This, probably, accounts for our not completing the plan with the outside wall, minarets, &c.; but I think we were particularly asked to make a plan of the interior, which was then little known.

From R. Phené Spiers [*F.*], F.S.A.—

Sir Charles Wilson, in the letter published p. 65, states that the only point on which he is unable to agree with me is "the extent to which Al Walid destroyed the church." He does not think that "he made a clean sweep of everything, re-using the material," but believes "many of the columns in the western half were, before the fire (of 1893), in their original position." Sir Charles Wilson evidently arrived at this conclusion when measuring the Mosque in 1865, because he says in his notes, "A large number of the original columns are apparently still *in situ*," this being "specially the case in the western half of the Mosque, which is by far the best preserved." May I venture, however, to express the opinion that the irregularity in the size and nature of the columns and capitals in the eastern half is due to restoration after the fire of 1069? It is probable that in the latter half of the eleventh century there was no longer that wealth of ancient Roman remains in the city of which the Khalif al Walid was able to avail himself in the commencement of the eighth century; hence columns of smaller size and a variety of capitals. In order to decide this question it is necessary to study the general plan of the Mosque, and if Sir Charles Wilson is willing to concede the point that Al Walid built the transept on a central axis between the south-east and south-west more ancient structures, it almost follows that the eleven equidistant bays on each side must have been set out afresh. That is, however, not the only argument in favour of the entire rebuilding. The style of these arcades, the dosserets, and the open arcades above are late rather than early Byzantine. The earliest dosserets, as distinguished from moulded architrave blocks, are found in St. Demetrius at Thessalonica, attributed by Fergusson to the commencement of the sixth century, and the method of obtaining greater height by a wall raised above the main arcades and pierced with arches or small arcades is the same as that adopted at a later date in Cordova. The dosserets in St. Demetrius are all sculptured with crosses, and the traces of similar decoration, but obliterated, might have been noted on the dosserets of the western half had they formed part of the original church. These, however, are questions of opinion. There is no doubt that the transcript of his original notes, which Sir Charles Wilson has been kind enough to forward for publication, are of the greatest possible value, seeing that of the forty granite columns in the Mosque thirty were thrown down in the late fire, and the materials may now be seen, as Dr. Masterman informs me, lying broken up on the main roads, and being used for their repair.

LEGAL.

Architects' Charges—Ownership of Drawings.

SKIPWORTH *v.* SKRINE.

This case came recently before his Honour Judge Lumley Smith, Q.C., in the Westminster County Court. The plaintiff, an architect, sued the Rector of Leadenham, Lincolnshire, for £32 14s. for visiting the church and making designs in response to a letter from the rector. The plaintiff prepared a drawing of a rood screen, also one of an east end, one of a pavement, and one of panelling. He estimated the total cost at about £1,300. Ultimately, for various reasons, the plaintiff's designs were not carried out. The defendant was willing to pay the amount claimed if the drawings were handed over to him, but the plaintiff was unwilling to part with them. At the hearing both parties, after some discussion, preferred that the plaintiff's remuneration should be assessed on the basis that the plaintiff would retain the drawings and the defendant make no claim to them. The plaintiff said that the work was special, and not subject to any scale applicable to ordinary architectural work, and he based his claim on the time occupied, which he estimated at fourteen days. His Honour, in delivering judgment, said that two of the drawings contained much detail which doubtless took time, but it was not clear that so much was required at that stage. In writing to the defendant's solicitor the plaintiff said it was only necessary to make diagram drawings sufficient to illustrate the nature of the design, and that such elaborate drawings as his were made on the supposition that he would retain them, and that the drawing of the chancel screen was to be exhibited in the church. In the absence of any agreement between the parties, his Honour gave judgment for the plaintiff for £20, including travelling expenses, the defendant abandoning all claim to the drawings.

RANSOME *v.* DE CASTRO.

In this case, heard in the same Court, his Honour said that the plaintiff, an architect, made plans and obtained tenders for two cottages which the defendant was willing to erect at a cost not exceeding £400. The tenders exceeded that sum, and the cottages were not built. The plaintiff received from the defendant the 3 per cent. on the lowest tender, which was the ordinary remuneration for what he had done. Some five years afterwards the plaintiff, at the defendant's request, obtained a fresh tender, without result. He also made some slight alterations in the plans. He then suggested to the defendant that, for the purposes of economy, a builder might be trusted to do the work under the control of the district surveyor without the supervision of an architect, in which case he would charge the builder two guineas for a set of tracings. This was not agreed to at the time; but eventually a builder volunteered to the defendant to do them for £400. The defendant applied to the plaintiff for the plans and specifications, and the plaintiff supplied copies, but sent with them a claim for two guineas. The defendant replied that as he had paid the plaintiff for making the drawings they were his property, and though he was willing to accept copies instead of the original drawings he would not pay for them. When the plaintiff commenced his action he limited his claim by his particulars to two guineas for making alterations in the drawings and specifications; but those alterations were unsubstantial, and there was no promise, either express or implied, on the part of the defendant to pay anything for them. The claim therefore failed.